

CLAIMS

1. A broad band cholesteric liquid crystal film comprising: a cholesteric liquid crystal film obtained by polymerizing a liquid crystal mixture containing a polymerizable mesogen compound (a), a polymerizable chiral agent (b) and a photopolymerization initiator (c) between two substrates with ultraviolet light, and has a reflection bandwidth of 200 nm or more.

2. The broad band cholesteric liquid crystal film according to claim 1, wherein a pitch length in the cholesteric liquid crystal film changes so as to narrow continuously from a side irradiated with ultraviolet light.

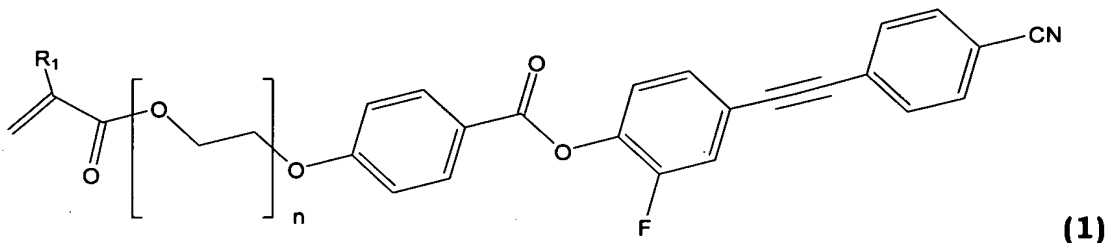
3. The broad band cholesteric liquid crystal film according to claim 1 or 2, wherein the polymerizable mesogen compound (a) has one polymerizable functional group and the polymerizable chiral agent (b) has two or more polymerizable functional groups.

4. The broad band cholesteric liquid crystal film according to any one of claims 1 to 3, wherein the liquid crystal mixture is free of an ultraviolet absorbent.

5. The broad band cholesteric liquid crystal film according to any one of claims 1 to 4, wherein the molar absorption coefficient of the polymerizable mesogen compound (a) is 50 to $500 \text{ dm}^3 \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$ at 365 nm.

6. The broad band cholesteric liquid crystal film according to any one of claims 1 to 5, wherein the polymerizable mesogen

compound (a) is a compound represented by the following general formula (1):



wherein R_1 represents a hydrogen atom or a methyl group, and n is an integer of 1 to 5.

7. A manufacturing method for the broad band cholesteric liquid crystal film according to any one of claims 1 to 6 comprising steps of: polymerizing a liquid crystal mixture containing a polymerizable mesogen compound (a), a polymerizable chiral agent (b) and a photopolymerization initiator (c) between two substrates with ultraviolet light.

8. A circularly polarizing plate comprising the broad band cholesteric liquid crystal film according to any one of claims 1 to 6.

9. A linearly polarizer comprising the circularly polarizing plate according to claim 8 and a $\lambda/4$ plate laminating on the circularly polarizing plate.

10. The linearly polarizer according to claim 9, the circularly polarizing plate, which is the cholesteric liquid crystal film, laminates on the $\lambda/4$ plate so that a pitch length in the film is narrowed toward the $\lambda/4$ plate continuously.

11. A linearly polarizer comprising an absorption polarizer

adhering to the linearly polarizer according to claim 9 or 10 so that a transmission axis direction of the absorption polarizer and a transmission axis of the linearly polarizer are arranged in parallel with each other.

12. The linearly polarizer according to any one of claims 9 to 11, wherein the $\lambda/4$ plate satisfies that a Nz coefficient defined by formula $(n_x - n_z)/(n_x - n_y)$ is -0.5 to -2.5 when in-plane major refractive indexes are n_x and n_y respectively and the major refractive index in the direction of thickness is n_z .

13. A luminaire comprising the circularly polarizing plate according to claim 8 or the linearly polarizer according to any one of claims of 9 to 12 on a front surface side of a surface light source having a reflective layer on the back surface side thereof.

14. A liquid crystal display comprising a liquid crystal cell in a light emitting side of the luminaire according to claim 13.